JOINT INTEGRATION TEST FACILITY YEAR 2000 (Y2K) TEST REPORT

FOR

CLIENT SERVER ENVIRONMENT SYSTEM SERVICES (CSE-SS) V1.4

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SECTION 1

1. INTRODUCTION

1.1 BACKGROUND

The Department of Defense Intelligence Information System (DODIIS) Management Board (DMB) has directed the Joint Integration Test Facility (JITF) to conduct Year 2000 (Y2K) integration testing, and to support Y2K interoperability testing conducted by the Joint Interoperability Test Command (JITC), as part of the migration system certification process. The JITF provides an environment that simulates, as closely as possible, the infrastructure attributes that will be found in the Year 2000.

JITF personnel conduct certification testing with support from the Program Management Office (PMO); operational users are also encouraged to participate. This coordinated team effort minimizes the risks associated with deploying intelligence applications into operational environments.

1.2 PURPOSE

The purpose of this document is to report the results of Y2K certification testing conducted for the CSE-SS PMO in a secure environment at Air Force Research Lab (AFRL), Rome Research Site, Rome, New York. Version 1.4 was tested from November 5, 1997 to November 8, 1997.

CSE-SS is an infrastructure program for DODIIS users that provides consistent and seamless access to all information processing resources. It ensures a uniform security baseline and delivers basic system administration tools. CSE-SS is a significant component of CSE and operates in system high environments.

1.3 OBJECTIVE

The JITF's overall objectives are to perform analyses and provide recommendations to migration system users, PMO, DMB, Engineering Review Board (ERB), Systems Integration Management Office (SIMO), and the DODIIS Executive Agent for Test and Evaluation (DExA for T&E), regarding certification testing results.

The test organizations and the migration system PMO determined the specific objectives of the certification testing process for the CSE-SS migration system during the planning process.

These objectives are to:

- Install the migration system software in the Y2K environment using the Configuration and Installation Guide provided by the PMO.
- Perform Y2K integration testing of CSE-SS using the draft JITF Y2K Test Procedures.
- Refine the JITF Y2K testing approach and procedures.

- Establish a stable baseline for future Y2K testing to include the infrastructure application CSE-SS.

1.4 SUMMARY AND RECOMMENDATION

Table 1-1 documents the high level findings of test activities. The remaining sections of this report provide further explanation and additional details. Document Review Reports (DRRs), Problem Reports (PRs), Change Requests (CRs), and Action Items document discrepancies and problems encountered during testing. This report is provided to the DMB, ERB, SIMO, DEXAs, and the CSE-SS PMO, and is also available on the Virtual Test Folder on Intelink.

Objective	Summary
Y2K INSTALLATION	Y2K Unix infrastructure testing was limited to Sun platforms, which were the only platforms for which a vendor-supplied Y2K compliant operating system was available in November 1997. Solaris 2.5.1 is Y2K compliant with patches installed, while Solaris 2.6 is delivered as fully Y2K compliant
Y2K INFRASTRUCTURE	The CSE-SS 1.4 "nis2prt.pl" utility configures the workstation's printer files. This "nis2prt.pl" utility will not function when the date is set beyond 2001. A resulting error message for Jan 1, 2005 is : "nis2prt.pl: failed to convert 'Sat Jan 1 01:05:14 2005' for prtconfig.org_dir.jitf.y2k." The problem stems from the date 2001 being hard coded in the "getdate.pl" library of the "nis2prt.pl" utility. This is the only finding against this application and has already been fixed by the PMO.
PROGRAM STATUS	The JITF identified no findings that must be corrected prior to use of CSE-SS 1.4 in Y2K.

Table 1-1 JITF Summary Test Results for CSE-SS 1.4

SECTION 2

2. TEST ENVIRONMENT

2.1 CONFIGURATIONS

2.1.1 Test Configuration

JITF personnel tested CSE-SS 1.4 in the AFRL facility. The following paragraphs summarize the hardware and software configurations used for testing. The hardware configuration section identifies each workstation and server used, and its role in the configuration. Tables detailing server and client configurations identify the hardware platform, operating system, and software.

Y2K Unix infrastructure testing was limited to Sun platforms, which were the only platforms for which a vendor-supplied Y2K compliant operating system was available during this test event. Solaris 2.5.1 is Y2K compliant with patches installed, while Solaris 2.6 is delivered as fully Y2K compliant.

The operating system and CSE-SS 1.4 infrastructure were examined by the Sun Microsystems Year 2000 Application Binary Interface tool (SY2KABI). The SY2KABI tool supports the following:

- Identification of the date related interfaces of interest at the Application Binary Interface (ABI) level.
- Application of the ABI profiling (interface dependency) tools to gather application interface usage data.
- Examination of application profile data to find all binaries that depend upon time and date related interfaces.

The SY2KABI tool consists of two primary applications, “y2000” and “y2000_usage”.

2.1.1.1 “y2000”

“y2000” examines compiled binary code for time related interfaces, both data structures and procedures. Time interfaces checked for include: ascftime, .asctime, asctime_r, cftime, ctime, ctime_r, difftime, getdate, gettimeofday, gmtime, gmtime_r, localtime, localtime_r, mktime, settimeofday, strftime, strptime, time, tzset, tzsetwall, and utime. For example, “/usr/openwin/bin/cm_delete” is dependent upon ctime, gmtime, localtime, mktime, time and tzset. The “y2000” application currently available from Sun did not function due to a bug in the Perl source code. The JITF examined the code and discovered that a standard external Perl subroutine was being called without the proper path defined in the Perl standard @INC array. The JITF corrected this problem and was able to implement the “y2000” utility.

The complete listings of the dependencies for both the operating system and CSE-SS 1.4 were generated and stored as a baseline for this tool using the JITF fix. These will be rerun as soon as an official solution to "y2000" is available from Sun.

The baseline shows the vendor calls interfaces from its own operating system that it has certified as Y2K compliant. CSE-SS 1.4 is also shown to call the Y2K compliant operating system interfaces. Comparison to this baseline will show any changes to the operating system interfaces. It is not acceptable for applications to re-direct shared operating system calls to their own interfaces in an effort to achieve Y2K compliance.

Applications should not modify shared operating system interfaces, but should use these shared interfaces whenever possible to ensure Y2K compliance.

2.1.1.2 "y2000_usage"

"y2000_usage" examines compiled binary code for reliance on Unix time functions. These include: asctime, ctime, getdate, gmtime, localtime, mktime, strftime, strptime, time, *printf, *gettext. If one of those time functions is detected, the binary is examined further for potential time related strings such as %19, %y and %D.

For example,

%y year without century as a decimal number (00-99) vs.

%Y year with century as a decimal number

%D date as mm/dd/yy

The complete listings for both the operating system and CSE-SS 1.4 were generated and stored as a baseline. The listings show the Y2K patches for Solaris 2.5.1 do not convert all occurrences of %y to %Y. For instance, "/usr/bin/uptime" uses %e%b%y. Applications need to be sensitive to how the vendor has chosen to implement its certified Y2K compliance. This may not always be through a four digit year.

The output from the "y2000_usage" lists potential time related strings. Depending upon the context, a detected %y may have an unrelated date meaning.

"y2000_usage" is required to use the Unix "nm" print name list of an object file to distinguish those executables relying on Unix time functions. Preliminary analysis by the JITF indicates "y2000_usage" may not be using "nm" properly to detect the time related functions. That is, "y2000_usage" seems to be searching some binaries for possible time related strings regardless of detected Unix time functions. This results in non-Unix time functions being searched with non-date related strings being detected as date related. JITF personnel are contacting Sun concerning the apparent "nm" usage problem.

2.2 HARDWARE CONFIGURATION

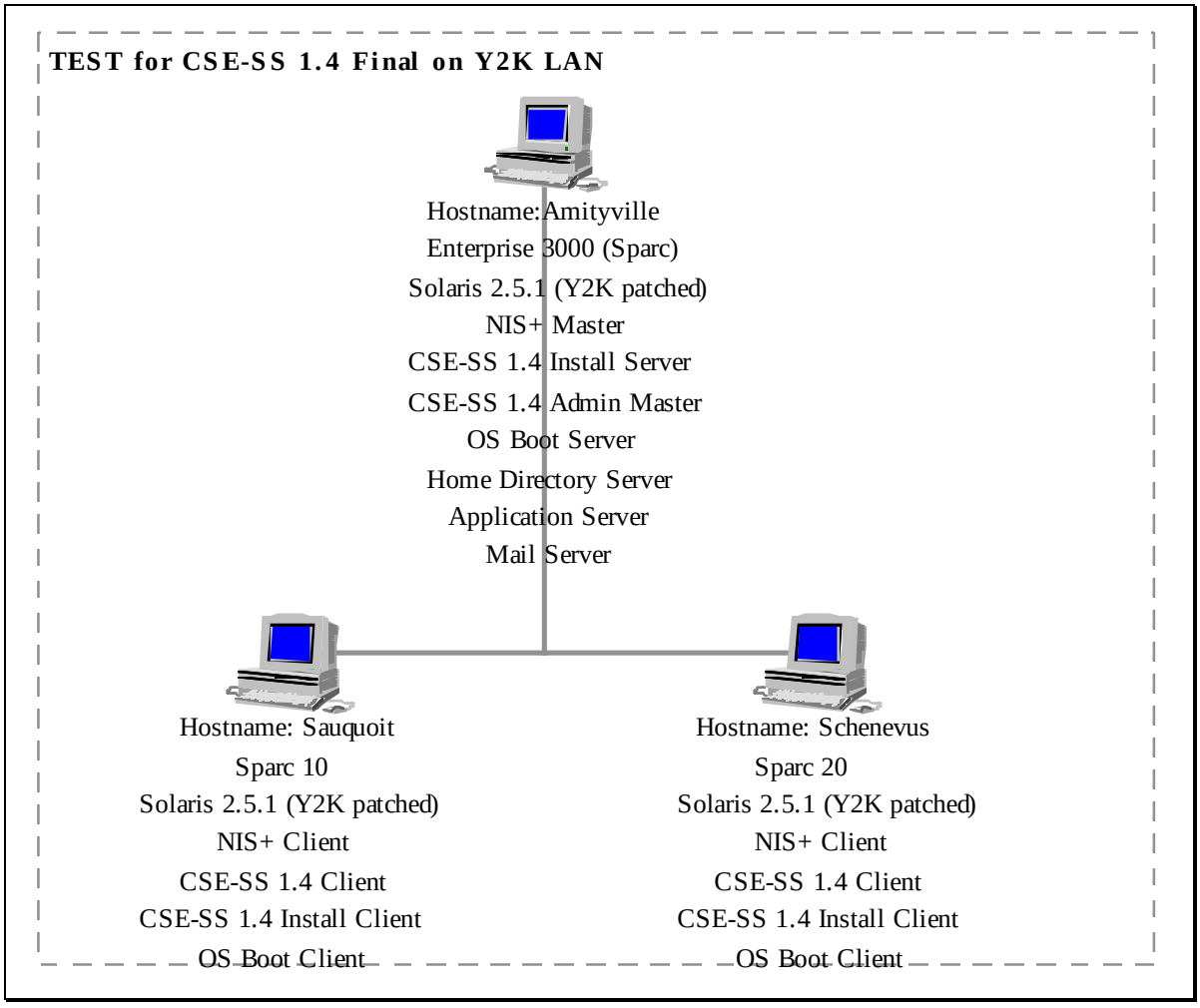

Figure 2-1 JITF Test Configuration for CSE-SS 1.4 on Y2K LAN

2.2.1 Server Configuration

Server (AMITYVILLE)	EXISTING	INSTALLED FOR TEST
HARDWARE - Sun Enterprise 3000 (Sparc) - 256M RAM - (1) 9.0G External - 8mm tape drive - CDROM		X
OPERATING SYSTEM - Solaris 2.5.1 - Y2K patches from Sun - Entire Distribution minus OEM support		X

CONFIGURATION - NIS+ Master - CSE-SS 1.4 Admin Master - CSE-SS 1,4 Install Server - Application Server - Mail Server		X

Table 2-1 Server Configuration for CSE-SS 1.4

2.2.2 Client Configuration

Server (SAUQUOIT)	EXISTING	INSTALLED FOR TEST
HARDWARE - Sparc 10 - 128M RAM - (0) Hard Drives		X
OPERATING SYSTEM - Solaris 2.5.1 - Y2K patches from Sun - Entire Distribution minus OEM support		X
CONFIGURATION - NIS+ client to Amityville - OS Boot client to Amityville - CSE-SS 1.4 client loaded on disk mounted from Amityville		X

Table 2-2 Client 1 Configuration for CSE-SS 1.4

2.2.3 Client Configuration

Server (SCHENEVUS)	EXISTING	INSTALLED FOR TEST
HARDWARE - Sparc 20 - 128M RAM - (0) Hard Drives - CDROM		X

OPERATING SYSTEM - Solaris 2.5.1 - Y2K patches from Sun - Entire Distribution minus OEM support		X
CONFIGURATION - NIS+ client to Amityville - OS Boot client to Amityville - CSE-SS 1.4 client loaded on disk mounted from Amityville		X

Table 2-3 Client 2 Configuration for CSE-SS 1.4

2.2.4 Reference Documents

The JITF testing process includes a comprehensive review of the documentation in the evaluation of system installation, compliance and integration. A large portion of the compliance testing is performed through inspection and analysis, to which the documentation is crucial. The testers review documentation prior to the start of JITF testing to learn the functional and structural aspects of the software, making the testing process more efficient.

2.2.4.1 PMO Provided Documentation

Document Title	Date
Software Center Operations Manual for the CSE-SS 1.4	22 August 1997
Software Users Manual for the CSE-SS 1.4	22 August 1997

2.2.4.2 JITF Documentation

Document Title	Date
DRAFT JITF Y2K Test Procedures	October 1997
JITF Concept of Operations (CONOPS)	4 April 1996
CUBIC Configuration Management Plan	25 July 1997
Year 2000 Concept of Operations for Integration and Interoperability	July 1997

SECTION 3

3. YEAR 2000 INTEGRATION TESTING

3.1 Y2K INFRASTRUCTURE FINDINGS

The Unix "date" command was used to advance the system date to various times of Y2K interest on both the server and client workstations. Additional testing was conducted with the clients remaining at the current date and the server being set ahead. The reverse procedure, setting the clients ahead with the server remaining at the current time, was also tested.

The following findings detail the results of this testing. The test performed is in italics and the results for each follow.

Test Case 1 *The system date was set to January 1, 2000, and the system was rebooted.*

The Solaris 2.5.1 systems correctly accepted January 1, 2000, and retained the date past the reboot system process restart boundary.

Changing the dates resulted in "stale NFS filehandle" errors being reported by the operating system. Despite this warning, NFS files were successfully mounted and accessible.

Test Case 2 *The system date was set to December 31, 1999, 2355, and the system was shutdown. After six minutes elapsed, the system was rebooted.*

The Solaris 2.5.1 systems correctly advanced to January 1, 2000.

Test Case 3 *The system date was set to February 28, 2000, 2355. After the date was set, the system was left idle for six minutes.*

The Solaris 2.5.1 systems correctly recognized February 2000 as a leap year and advanced the date to February 29, 2000.

Test Case 4 *The system date was set to February 28, 2000. Three sample files were created with the Unix touch command. The date was advanced to March 1, 2000. The Unix find command was used to list all files created in the last two days.*

The created files were listed, indicating they had been created two days ago. Since two days existence were detected for these files, year 2000 was properly understood as a leap year, with February 29th existing.

Test Case 5 *The system date was set to February 28, 2000. A sample user was created under CSE-SS with a password. The sample user was logged in. The sample user's password was then marked as expiring in two days. The date was set forward to March 1, 2000. The sample user tried to login again but could not because the password had expired.*

Since two days were properly detected as having elapsed, February 29, 2000 was properly detected as existing.

Test Case 6 *The system date was set to January 1, 2005.*

The CSE-SS 1.4 “nis2prt.pl” utility configures the workstation’s printer files. This “nis2prt.pl” utility will not function when the date is set beyond 2001. A resulting error message for Jan 1 2005 is :

“nis2prt.pl: failed to convert ‘Sat Jan 1 01:05:14 2005’ for prtconfig.org_dir.jitf.y2k.”

The problem stems from the date 2001 being hard coded in the “getdate.pl” library of the “nis2prt.pl” utility. (RCO 97 36 635 - Note: The CSE-SS PMO verified this PR as closed and fixed in CSE-SS 1.4a as of February 13, 1998.)

Additionally, when the Unix “date” was set to January 1, 2005 on the Enterprise 3000 Sparc server, the system locked. It had to be completely powered down and rebooted. This is concluded to be related to the Enterprise 3000 and not a problem with CSE-SS 1.4 since the date was correctly accepted on the Sparc 10 and Sparc 20 platforms with the same software configuration. Setting the date from 2005 back to the current date does not affect the system.

SECTION 4

4. ANALYSES

4.1 FINDINGS REQUIRING CORRECTION PRIOR TO DEPLOYMENT

JITF personnel identified no findings that must be corrected prior to use of CSE-SS in Y2K.

4.2 FINDINGS REQUIRING RESOLUTION

The following finding was corrected by the CSE-SS PMO in CSE-SS 1.4a as of February 13, 1998.

- The CSE-SS 1.4 "nis2prt.pl" utility configures the workstation's printer files. This "nis2prt.pl" utility will not function when the date is set beyond 2001. A resulting error message for Jan 1 2005 is :

  > "nis2prt.pl: failed to convert 'Sat Jan 1 01:05:14 2005' for prtconfig.org_dir.jitf.y2k."

  The problem stems from the date 2001 being hard coded in the "getdate.pl" library of the "nis2prt.pl" utility. (RCO 97 36 635)

4.3 AREAS OF CONCERN

The JITF found no additional areas of concern for this application.

SECTION 5

5. PARTICIPANTS

NAME	RESPONSIBILITY	ORGANIZATION	TELEPHONE
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Lee Gallagher	Test Director	JITF/BAH	315-330-1786
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William Horan	Tester/Analyst	JITF/MEI	315-330-2214
Beth Price	Facility Support	JITF/BAH	315-330-4090
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Table 5-1 List of Test Participants

SECTION 6

6. ACRONYMS

ACRONYM	DEFINITION
ABI	Application Binary Interface
AFRL	Air Force Research Lab
CIG	Configuration and Installation Guide
CONOPS	Concept of Operations
COTS	Commercial Off The Shelf
CR	Change Request
CSE	Client Server Environment
CSE-SS	Client Server Environment System Services
DEXA	DODIIS Executive Agent
DODIIS	Department of Defense Intelligence Information System
DMB	DODIIS Management Board
DRR	Document Review Report
DT&E	Development Test & Evaluation
ERB	Engineering Review Board
GOTS	Government Off The Shelf
JITC	Joint Interoperability Test Command
JITF	Joint Integration Test Facility
JTPM	Joint Test Planning Meeting
NFS	Network File System
NIS	Network Information Service
OS	Operating System
PERL	Practical Extraction and Report Language
PMO	Program Management Office

PR	Problem Report
SIMO	Systems Integration Management Office
SY2KABI	Sun Microsystems Year 2000 Application Binary Interface tool
Y2K	Year 2000

Table 6-1 Acronym List

7. PROBLEM REPORTS

PR_Nr Title_		Text_

RCO 97 36 635 | THE CSE-SS 1.4 NIS2PRT.PL UTILITY WILL NOT FUNCTION WHEN THE DATE IS SET BEYOND 2001	2 | Closed
	
	Fixed in CSE-SS 1.4a per PMO.
		The CSE-SS 1.4 “nis2prt.pl” utility will not function when the date is set beyond 2001. A resulting error message for Jan 1, 2005 is :
		
		“nis2prt.pl: failed to convert ‘Sat Jan 1 01:05:14 2005’ for prtconfig.org_dir.jitf.y2k.”
		
		The problem stems from the date 2001 being hardcoded in the “getdate.pl” library of the “nis2prt.pl” utility.
		
		In “getdate.pl” under "sub dateconv"
		
		if ($yy < $epoch || $yy > 2001 || $mm < i || $mm > 12 || $dd < 1 || $dd > $mdays[--$mm]) {
		return -1;
		}